MECHANICAL SYSTEMS DATA SHEET: VESSEL

PLANT ITEM No. *24590-PTF-MV-PWD-VSL-00043*

Project	*RPP-WTP*	P&ID	*24590-PTF-M6-PWD-P0002*
Project No	*24590*	Process Calculation	*DELETED* 2
Project Site	*Hanford*	Vessel Drawing	*24590-PTF-MV-PWD-P0003001* ISSUED BY RPP-WTP PDC
Description	*HLW Effluent Transfer Vessel*		

Reference Data

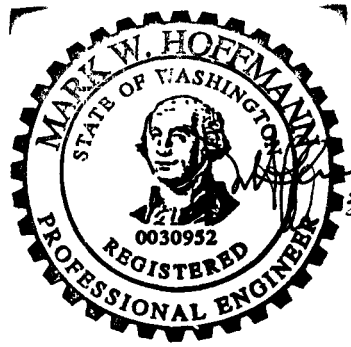
Charge Vessels (Tag Numbers)	*PWD-VSL-00141, PWD-VSL-00142*
Pulsejet Mixers / Agitators (Tag Numbers)	*PWD-PJM-00041, PWD-PJM-00042, PWD-PJM-00043, PWD-PJM-00044, PWD-PJM-00045, PWD-PJM-00046, PWD-PJM-00047, PWD-PJM-00048*
RFDs/Pumps (Tag Numbers)	*PWD-RFD-00141, PWD-RFD-00142*

Design Data

Quality Level		*QL-1*	Fabrication Specs	*24590-WTP-3PS-MV00-T0001*		
Seismic Category		*SC-I*	Design Code	*ASME VIII Div 1*		
Service/Contents		*Radioactive Liquid*	Code Stamp	*Yes*		
Design Specific Gravity		*1.57*	NB Registration	*Yes*		
Operating Volume	gal	*29,580*	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	*41,650*	Estimated	*115,400*	*503,700*	*465,000*
Environmental Qualifications 2		*N/A*	Actual *	*129,000* 2	*517,300* 2	*499,400* 2

Inside Diameter	inch	*288*			Wind Design	*Not Required*	
Length/Height (TL-TL)	inch	*89*			Snow Design	*Not Required*	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	*24590-WTP-3PS-SS90-T0001* *24590-WTP-3PS-MV00-T0002*	
Internal Pressure	psig	*0*	*15*	*N/A*	Seismic Base Moment *	ft*lb	
External Pressure	psig	*0.22*	*FV*	*N/A*	Postweld Heat Treat	*Not Required*	
Temperature	°F	*218* 2	*225* 2	*N/A*	Corrosion Allowance	Inch	*0.08 (Notes 7,8)* 2
Min. Design Metal Temp.	°F	*0*			Hydrostatic Test Pressure *	Psig	*19.5* 2

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.



3/28/05

EXPIRES 12/10/06

This Bound Document Contains a total of 6 sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
2	3/28/05	Issued for Permitting Use				
1	3/27/03	Issued for Permitting Use	J. Jackson	C. Slater	N/A	M. Hoffmann
0	9/17/02	Issued for Permitting Use	J. Jackson	C. Slater	N/A	S. Kirk

R10523239

	MECHANICAL SYSTEMS DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-PWD-VSL-00043

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	SA 240 316 with max. Carbon of 0.030 %	See Drawing	Auxiliary (Note 1) 2
Shell	SA 240 316 with max. Carbon of 0.030 %	See Drawing	Primary (Note 1) 2
Bottom Head	SA 240 316 with max. Carbon of 0.030 %	See Drawing	Primary (Note 1) 2
Support	SA 240 304 with max. Carbon of 0.030 % (Note 3) 2	See Drawing	N/A
Jacket/Coils/Half-Pipe Jacket	N/A	N/A	N/A
Internals	SA240 316 with max. Carbon of 0.030 %	See Drawing	Thermowell Primary (Note 1) 2
Pipe	SA312 TP316 Seamless with max. Carbon of 0.030%	See Drawing	See Note 1
Forgings/ Bar stock	SA182 F316/SA 479 316 with max. Carbon of 0.030%	See Drawing	As Note 1 for Nozzle Necks
Gaskets	N/A	N/A	N/A
Bolting	N/A	N/A	N/A

Miscellaneous Data

Orientation	Vertical	Support Type	Skirt
Insulation Function	Not Applicable	Insulation Material	Not Applicable
Insulation Thickness (inch)	Not Applicable	Weld Surface Finish	De-scaled as laid

Remarks

* To be determined by the vendor.

Note 1: All welds forming part of the primary and auxiliary containments, including the nozzle attachment welds shall be subjected to 100% volumetric examination. Radiography is the preferred method of volumetric testing. If it is considered impractical to perform radiographic examination, the Seller may propose ultrasonic examinations. 2

Note 2: Vessel supports shall be designed to restrain the vessel in a fully buoyant state.

Note 3: Ring Beam bottom flange material shall be A 572 Gr. 50.

Note 4: Vessel volumes are approximate and do not account for manufacturing tolerances, nozzles, and displacement of internals. 2

Note 5: Contents of this document are Dangerous Waste Permit affecting. 2

Note 6: Deleted. 2

Note 7: BNI shall ensure that an additional 0.123" is available for erosion in the bottom head and shall report the minimum thickness required for all specified loading conditions, exclusive of erosion and corrosion allowances. 2

Note 8: BNI shall ensure that an additional 0.078" is available for erosion in the interior conical surface of the pulse jet mixers. 2

Note 9: Required data for thermal stress analysis for nozzles exposed to higher temperatures. 2

- **Cell ambient temperature = 113°F**
- **Headspace temperature or Operating temperature = 218°F**
- **Ambient and headspace natural convection heat transfer coefficients = 0.895 Btu/hr ft² °F for vessel head and 0.797 Btu/hr ft² °F for vessel shell**
- **Inlet fluid transfer frequency and mass flow rate for nozzle N36.**

  Steam max temperature = 352°F

  Transfer frequency = 1 transfer/month

  Steam mass flow rate = 1,399 lb/hr

Note 10: All hydrodynamic and overblow loads are for BNI internal use only and are to be disregarded by the seller. 2

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	**PLANT ITEM No.** ***24590-PTF-MV-PWD-VSL-00043***

Equipment Cyclic Data Sheet

Plant Item Number:	***24590-PTF-MV-PWD-VSL-00043***
Component Description	***Parent Vessel***

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	***SA 240 316 with max. Carbon of 0.030 %***
Design Life	***40 years***
Component Function and Life Cycle Description	• ***Receive and store waste from HLW Vitrification Plant, pit sump (PWD-SUMP-00040), and various line drains.*** • ***Transfer waste to Plant Wash Vessel (PWD-VSL-00044)*** ***HLW Effluent Transfer Vessel operates at normal operating level for a ventilation seal between facilities. It's Charge Vessels discharge liquid during normal operation and equal volumes of liquid are received into the vessel. The vessel is normally emptied once per day. Washdown is not more than once per year.***

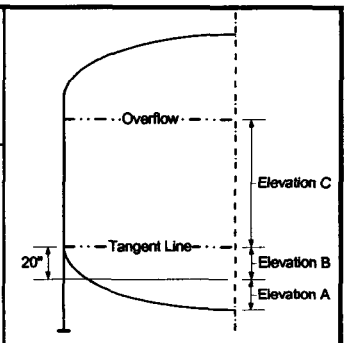
Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	***FV***	***15***	***10***	***Nominal assumption***
Operating Pressure	psig	***-0.22***	***0***	***14,600***	
Operating Temperature	°F	***59***	***218*** △2	***14,600***	***Uniform material temperature range, not between two points***
Contents Specific Gravity		***1.0***	***1.57***	***N/A***	
Contents Level	inch	***Empty***	***Flooded***	***14,600***	***Coincident with pressure cycles***
Localized Features					
Nozzles		***Within 50°F of vessel operating range***		***As above***	

Hydrodynamic Loading △2

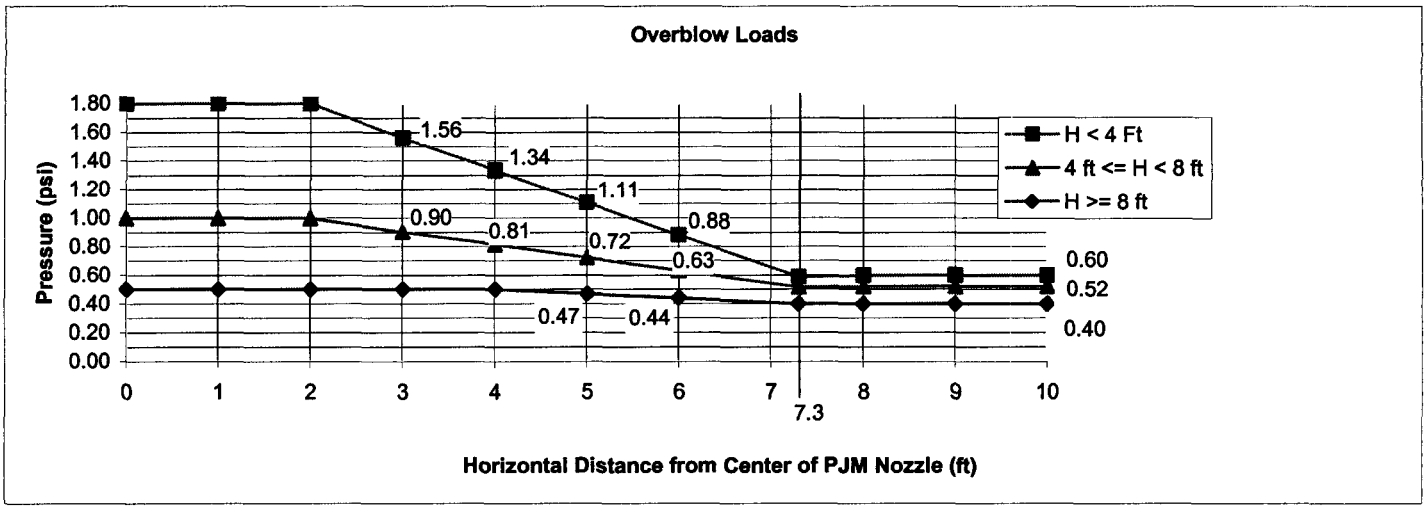
In normal operation, pulse jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overblow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed for the combination of the normal operational hydrodynamic loads and overblow loads, and this load combination is also to be assumed to act concurrently with seismic loads.

The following table indicates the normal hydrodynamic pressure at ranges of elevations in the vessel and the number of design cycles for each condition. The hydrodynamic forces cycle between the indicated pressure ranges applied across the projected area of the component. Positive hydrodynamic forces act in the radial, outward direction and the vertical, upward direction. Apply the radial load simultaneously in the radial direction and normal to the radial direction in the horizontal plane.

Normal Operation Hydrodynamic Pressure Range, psi						Number of Cycles
Elevation A		Elevation B		Elevation C		
Radial	Vertical	Radial	Vertical	Radial	Vertical	
-0.15 to 0.25	***-0.15 to 0.15***	***-0.05 to 0.12***	***-0.15 to 0.15***	***-0.03 to 0.10***	***-0.06 to 0.15***	***5.1×10^6***



Overblow loads vary as a function of the distance from the center of the overblowing pulse jet mixer nozzle and the elevation 'H' above the overblowing pulse jet mixer nozzle up to the overflow level as plotted:



The overblow pressure shall only be applied to the projected area of the overblowing pulse jet mixer in the vertical, upward direction and to all surrounding components in the horizontal plane, radiating from the overblowing pulse jet mixer. Any single pulse jet mixer may overblow 100 cycles. 2

Notes

- *Cycle increase: Increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.* 2
- *Nozzle N36 shall be fatigue assessed/analyzed for 500 temperature/pressure cycles from 0 psig at 59°F to 15 psig at 352 °F, the pressure cycles shall coincide with the temperature cycles. See Note 9, on Page 2.* 2

Equipment Cyclic Data Sheet

Plant Item Number:	*PWD-VSL-00141, PWD-VSL-00142*
Component Description	*Charge Vessels*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*SA 240 316 with max. Carbon of 0.030 %*
Design Life	*40 years*
Component Function and Life Cycle Description	*These charge vessels are cyclically loaded using vacuum to fully fill the vessel with process liquid and compressed air to fully empty the charge vessel. The charge vessels are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The charge vessel supports shall be designed to cycle between fully buoyant (charge vessel empty and parent vessel full) and fully loaded (charge vessel full and parent vessel empty).*

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*55*	*10*	*Nominal assumption*
Operating Pressure	psig	*FV*	*30*	*761,000*	
Operating Temperature	°F	*59*	*218* △2	*14,600*	*Pressure cycles to be at 218 °F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points.* △2
Contents Specific Gravity		*1.0*	*1.57*	*N/A*	
Contents Level	inch	*Empty*	*Flooded*	*761,000*	*Coincident with pressure cycles*
Localized Features					
Supports		*As above*		*As above with contents level changing coincident with pressure cycle*	

Notes

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***

Equipment Cyclic Data Sheet

Plant Item Number:	*PWD-PJM-00041, PWD-PJM-00042, PWD-PJM-00043, PWD-PJM-00044, PWD-PJM-00045, PWD-PJM-00046, PWD-PJM-00047, PWD-PJM-00048*
Component Description	*Pulse Jet Mixers*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*SA 240 316 with max. Carbon of 0.030 %*
Design Life	*40 years*
Component Function and Life Cycle Description	*These pulse jet mixers (PJMs) are cyclically loaded using vacuum to fully fill the PJM with process liquid and compressed air to fully empty the PJM. The PJMs are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The PJM supports shall be designed to cycle between fully buoyant (PJM empty and parent vessel full) and fully loaded (PJM full and parent vessel empty) in addition to thrust.* 2

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*85*	*10*	*Nominal assumption*
Operating Pressure	psig	*FV*	*60*	*5.1×10^6*	
Operating Temperature	°F	*59*	*218* 2	*5.1×10^6*	*Pressure cycles to be at 218 °F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points.* 2
Contents Specific Gravity		*1.0*	*1.57*	*N/A*	
Contents Level	inch	*Empty*	*Flooded*	*5.1×10^6*	*Coincident with pressure cycles*
Thrust Load 2	lbf	*0*	*264*	*5.1×10^6*	*Coincident with pressure cycles*
Localized Features					
Supports		*As above*		*As above with contents level changing coincident with pressure cycles.*	

Notes

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***